Development Plan for the Phased Expansion of Transmission to Access Renewable Resources in the Imperial Valley

Report
of the
Imperial Valley Study Group

Presented to the California Energy Commission

2005 Integrated Energy Policy Report

September 30, 2005

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	Power Flow		Transient Stability		Post-Transient		
Alternative/ Dispatch	Heavy Summer	Light Autumn	Heavy Summer	Light Autumn	Heavy Summer	Light Autumn	Production Cost
Base	✓	✓	✓	✓	✓	✓	✓
Base Sensitivity							✓
Alt. 1/D1	✓						
Alt. 1/D2	✓						
Alt. 2/D1	✓		✓		✓		
Alt. 2/D2	✓		✓				
Alt. 2/D3		✓		✓		✓	✓
Alt. 2/D4		✓		✓			
Alt. 2 Sensitivity							✓
Alt. 2a/D3		✓		✓		✓	✓
Alt. 2a/D4		✓		✓			
Alt. 3a/D1	✓						
Alt. 3a/D2	✓						
Alt. 3b/D1	✓		✓		✓		
Alt. 3b/D2	✓		✓				
Alt. 3b/D3		✓		✓		✓	✓
Alt. 3b/D4		✓		✓			
Alt. 4a/D1	✓						
Alt. 4a/D2	✓						
Alt. 4b/D1	✓						
Alt. 4b/D2	✓						
Alt. 5/D1	✓						
Alt. 5/D2	✓						
Phase 1	✓	✓	✓	✓	✓	✓	
Phase 2	✓	✓	✓	✓	✓	✓	

Glossary

APS	Arizona Public Service Company
CAISO	California Independent System Operator
CEC	California Energy Commission
CEQA	California Environmental Quality Act
CFE	Comisión Federal de Electricidad
CEERT	Center for Energy Efficiency and Renewable Technologies
CPCN	Certificate of Public Convenience and Necessity
CPUC	California Public Utilities Commission
CSP	Concentrating Solar Power
Definitive Plan	Transmission facilities specified in sufficient detail to be approved by regulatory agencies for ratemaking and construction
EIR	Environmental Impact Report
FERC	Federal Energy Regulatory Commission
FS	Facilities Study
Gen-tie	Transmission line connecting a generator to the grid
IID	Imperial Irrigation District
IOU	Investor Owned Utility
IVSG	Imperial Valley Study Group
KGRA	Known Geothermal Resource Area
kWh	Kilowatt-hour
LADWP	Los Angeles Department of Water and Power
MW	Megawatt (1,000 kW)
MWD	Metropolitan Water District
NERC	North American Electricity Reliability Council
SP 15	South of Path 15
PEA	Proponent's Environmental Assessment
PG&E	Pacific Gas & Electric
PPA	Power Purchase Agreement
PWG	IVSG Permitting Work Group
RAS	Remedial Action Scheme
RMR	Reliability Must Run
ROW	Right Of Way
SCE	Southern California Edison Company
SCPPA	Southern California Public Power Authority
SDG&E	San Diego Gas & Electric Company
Sec. 399.25	Section of California Public Utilities Code implementing RPS statutes
SIS	System Impact Study
SPS	Special Protection System
SRP	Salt River Project
STEP	Southwest Transmission Expansion Plan
SWPL	Southwest Power Link
TCSG	Tehachapi Collaborative Study Group
TO	Transmission Owner
TWG	IVSG Technical Work Group
WAPA	Western Area Power Administration
WECC	Western Electricity Coordinating Council

Executive Summary

California's Imperial Valley contains 1,950 MW of geothermal power reserves and one-quarter of the state's entire solar generation potential. This is in addition to the more than 500 MW of renewable resources that the Imperial Irrigation District (IID) delivers across its system today. Meeting the state's renewable energy goals requires access to these new resources. Very little transmission capacity is currently available to export such additional generation.

The Imperial Valley Study Group (IVSG) was formed to recommend a phased plan for the development of the transmission necessary to export 2,200 MW of renewable generation from the region. As with the Tehachapi Collaborative Study Group, the development of transmission solutions to access renewable resources has been sought by the California Public Utilities Commission (CPUC) and by the California Energy Commission (CEC) in its 2005 Integrated Energy Policy Report proceeding.

The IVSG is a voluntary planning collaborative made up of regional stakeholders. Participants include all regional Transmission Owners, the California Independent System Operator (CAISO), CPUC, CEC, generation developers, local, state and federal agencies, environmental and consumer groups and other interested parties. Its work has been led by the Imperial Irrigation District (IID), San Diego Gas & Electric (SDG&E) and Southern California Edison (SCE), and is fully supported by Los Angeles Department of Water and Power (LADWP). Its mission is to evaluate and recommend regional transmission solutions that meet threshold requirements for reliability, least cost development and for minimizing environmental impact. These solutions cross control area boundaries and require coordination among several transmission owners, Load Serving Entities, regulatory and government agencies and other interests.

Given this fundamental need for regional cooperation, the IVSG did not promote the interests of any one organization. It identified alternative solutions for study based on its own independent evaluation of the existing transmission infrastructure. IVSG planning work does, however, build on IID's proposed Green Path Initiative. As presented at CEC workshops in 2004 and 2005, this is an on-going program to upgrade the IID transmission system to support the export of additional renewable generation from the Imperial Valley to multiple delivery points. IVSG planning has also built on SDG&E's Transmission Comparison study of a new 500 kV connection to San Diego. This enabled the Study Group, among other things, to evaluate the deliverability of Imperial Valley generation to the CAISO grid much more quickly than it otherwise would have been able to do. The IVSG regularly presented status reports on its work at STEP meetings during the course of its study. This brought the IVSG's own studies of power flows from the Imperial Valley to the attention of planners from the entire southwest region who are not directly involved in the IVSG.

IID and LADWP operate their own control areas, distinct from the CAISO; both are independent of regulation by the CPUC and FERC. The IVSG development plan respects their regulatory independence, while also establishing a basis for the cooperation necessary

to support such a large-scale development involving publicly owned and investor-owned utilities operating across multiple control areas.[1]

The recommendations in this report flow from detailed transmission planning studies conducted by the participants. The IVSG first identified a range of transmission alternatives capable of exporting 2,200 MW of new generation from the Imperial Valley area to regional load serving entities. Initial power flow screening analysis led the group to select three of these alternatives for additional, extensive study. Power flow, voltage stability and post-transient studies considered single and double contingencies at key facilities in the region. Production simulations were performed to estimate the savings in production cost and the impact on congestion on major lines with 2,200 MW of new generation added. To determine the optimal way of phasing this development, the IVSG re-studied the upgrades required for delivering the new generation in smaller increments. This report includes a full description of the study assumptions, methodology and results. In addition to export paths, SCE and SDG&E evaluated network upgrades on their systems necessary to make Imperial Valley generation deliverable to load centers.

Independent of the IVSG, LADWP has also conducted transmission planning activities to develop a transmission plan to access Imperial Valley geothermal resources to serve LADWP customers. This IVSG report takes note of LADWP's transmission development plan.

The transmission solutions presented in this report are conceptual and do not constitute a detailed plan of service. The IVSG had neither the time nor the resources necessary to complete the kind of analysis typically required for System Impact Studies or Facilities Studies. Additional studies will therefore be required before any of the proposed facilities could be approved for interconnection by the transmission owner, or by regulatory agencies (in the case of the Investor Owned Utilities) for ratemaking and construction, or for increasing WECC Path Ratings. This report explains the limitations of the studies on which its development recommendations are based, and identifies the further studies needed.

Phasing of Transmission Development

The IVSG transmission plan consists of three development phases, designed to provide market access for 2,200 MW of renewable resources, primarily geothermal and solar, in the Imperial Valley region. These resources are identified in the CEC Renewable Resources Development Report.[2] After IVSG transmission planning work had been completed, SDG&E announced a major purchase of solar power from the Imperial Valley. No wind power projects have yet been proposed to IID or the Imperial County Planning and Development Services Department, but the IVSG plan readily supports interconnection of any renewable generating technology to the IID system.

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[1] Arizona Public Service (APS), the Western Area Power Administration (WAPA) and the Comisión Federal de Electricidad (CFE) also operate separate control areas in the region; all have participated in the IVSG.

[2] The CEC Renewable Resources Development Report (RRDR) was adopted by the CEC and sent to the Legislature on November 19, 2003. SB 1038 required the CEC to prepare this plan for the development of California's renewable resources.

Phase 1 would accommodate three new geothermal plants (or equivalent resources), 645 MW total, capable of being in service by the end of 2010. The size and timing of Phase 1 is based on CalEnergy's estimate of its work to conclude Power Purchase Agreements for three such plants. These generating units at the southern end of the Salton Sea would connect to the existing IID system at IID's Midway substation, which would be expanded to accommodate the additional lines from the new resources. Upgrades of the IID transmission system would be required from its Highline substation to El Centro substation (approximately 20 miles), and from El Centro to the Imperial Valley substation (approximately 18 miles), where the power would be delivered to the CAISO grid. These upgrades to existing facilities would be constructed to accommodate the ultimate capacity anticipated by IID to be capable to deliver additional future resources. These upgrades would take advantage of existing facilities to minimize cost and environmental impact; they would be constructed, owned and operated by IID.

The other major component of Phase 1 is a new 500 kV line from the Imperial Valley (IV) substation to San Diego County, with 230kV connections to SDG&E's load center.[3] IVSG studies established that a line from the IV substation to San Diego County would make Imperial Valley generation deliverable to load centers in San Diego and to other load centers in Southern California and to the north. SDG&E's project to accomplish this is called the Sunrise Powerlink.

Phase 2 would accommodate an additional three geothermal plants (or equivalent), or 645 MW of incremental generation, bringing the cumulative new export capacity total to 1,290 MW. Based on CalEnergy's development schedule, Phase 2 upgrades should be timed to be available by approximately the end of 2016. These upgrades would also provide market access for Concentrating Solar Power (CSP) generation projects, and/or other renewable generation projects developed in that timeframe, in place of or in addition to new geothermal units. Phase 2 would upgrade IID's existing El Centro-Avenue 58 transmission line, from its El Centro substation to its planned Bannister substation west of the Salton Sea geothermal field. The El Centro-Bannister upgrade to 230 kV, approximately 25 miles, would utilize existing ROW. IID would also construct a new 230 kV line from the Bannister substation to a new San Felipe 500/230 kV substation to interconnect to the Imperial Valley to San Diego 500 kV line. This San Felipe substation could potentially provide an additional interconnection between the IID and CAISO systems, and thus another point for the delivery of renewable resources to Southern California loads. IID would construct, own and operate these upgrades.

Phase 3 upgrades would make an additional 910 MW of Imperial Valley generation deliverable to the CAISO grid, bringing cumulative incremental export capacity to 2,200 MW. As with Phases 1 and 2, most of the new Imperial Valley generation would be scheduled to SDG&E, to minimize congestion at Devers. Additional upgrades of the IID transmission system would support delivery of renewable resources to the Mirage/Devers

[3] SDG&E has proposed building and owning this line and is in the process of planning this project, which was studied as part of the IVSG effort. Alternatively, portions of that line or another 500 kV line in Imperial County could be built and owned by IID.

230 kV system, and/or accommodate unintended flow across Path 42. These additional upgrades of the IID system in Path 42 take advantage of existing facilities and ROW to minimize cost and environmental impact. Upgrades of the SCE portion of Path 42, from Mirage to Devers, and to SCE's west of Devers Substation may also be required.

Multiple Interconnections

In practice, the size and timing of the phases will be determined by where the renewable power is sold via power purchase agreements (PPAs). Phases 1-3, as studied by the IVSG, anticipate power sales to customers able to take delivery from the CAISO. The LADWP, Western and APS systems also interconnect to the IID Control Area, and the upgrades of the IID network recommended in this report support power sales to customers on those systems. Several Load Serving Entities who would not take delivery from CAISO interconnections have expressed interest in obtaining Imperial Valley geothermal power. Power sales to LADWP, and/or to entities in Arizona could require construction of the proposed Indian Hills substation, and/or upgrades of IID's connections to the WAPA and/or APS systems. It is also possible that power sales could require the identified Phase 1-2 upgrades (for deliveries to the CAISO grid) and upgrades of other IID interconnections.

Generation additions in the IID system were found to increase loading on the IID-APS interconnection at Yucca by approximately 1%. This increase is significant because the interconnection is only rated 135 MVA. Today, the APS load serving capability in the Yuma Area is limited by contingency flow on this tie, primarily for the loss of the Hassayampa-North Gila 500 kV line. As renewable resources are added to the IID system associated with any phases of this project, this tie will need to be reviewed for potential impacts and mitigation.

LADWP and IID have recently announced that they are exploring a 500 kV tie between their systems, at the proposed Indian Hills 500/230 kV substation, as described more fully below. The IVSG studied a connection of the IID system to SCE's Devers-Palo Verde No. 2 500 kV line as an alternative, but did not study such a connection to the LADWP system, and so could not include it in the development phases defined in this report. If the new LADWP 500 kV line is proposed to connect to SCE's Devers-Palo Verde No. 2 500 kV line, LADWP would need to submit an interconnection request to SCE to perform system impact studies for this proposed connection. Construction of such a line could alter the size, timing and transmission upgrades proposed for each development phase. Study of the effect of this LADWP-IID connection on Imperial Valley development is anticipated to begin in fall 2005.

The major components of each phase include:

Phase 1
Export capacity: 645 MW
In Service Year: 2010
Estimated cost, IID Upgrades: $ 72 million
(cost of the 500 kV line into San Diego not included)

Lines:	Upgrade Highline to El Centro and to IV substations, 40 miles New Geo Collector substation 1 to Midway, approx. 15 miles New IV to San Diego-Central, approx. 90 miles, 500 kV; with 230 kV lines into SDG&E load center
Substations:	New Geothermal Collector substation 1, 230 kV Expand El Centro substation; expand Midway substation

Phase 2
Export capacity: 645 MW (1,290 MW cumulative)
In Service Year: 2016
Estimated cost, IID Upgrades: $ 60 million

Lines:	New Bannister to San Felipe substation, 20 miles, 230 kV Upgrade existing El Centro to Bannister, approx. 25 miles New IID Collector substation 2 to Bannister, 230 kV
Substations:	New IID Collector substation 2, 230 kV New IID San Felipe 500/230 kV substation

Phase 3
Export capacity: 910 MW (2,200 MW cumulative)
In Service Year: 2020
Estimated cost, IID Upgrades: $ 105 million

Lines:	Upgrade existing Coachella Valley to Mirage/Devers, 40 miles Upgrade existing Bannister to Coachella Valley, 55 miles Tie Bannister to Collector substations to Midway, 1 mile
Substations:	Expand Coachella Valley substation (Upgrades to west of Devers Substation not included)

LADWP Transmission Development

The LADWP transmission plan consists of the development of a new 500 kV transmission line from IID to LADWP associated with the development of 400 MW renewable resources, primarily geothermal, in the Imperial Valley region. The IID-LADWP transmission line is planned to be connected to a new IID Indian Hills substation and a new LADWP Upland substation. The Indian Hills substation is envisioned to interconnect the planned Devers-Palo Verde– No. 2 500 kV line. The proposed Upland substation would be constructed along the existing 287 kV Victorville–Century transmission line. The transmission plan also includes upgrading a section of the Victorville–Century line from 287 kV to 500 kV, and 230 kV line upgrades within the IID system.

The IID-LADWP transmission line would also be used to deliver about 400 MW of LADWP Palo Verde power which is currently delivered on the existing Devers-Palo Verde Transmission Line 1.

The major components of the LADWP transmission plan include:

LADWP Transmission Plan Estimated renewable export capacity: 400+ MW	
Lines:	New Indian Hills to Upland, 500 kV, 100 miles Upgrade existing Upland to Victorville line to 500 kV, 34 miles New Coachella to Indian Hills, approx. 5 miles
Substations:	New Indian Hills 500/230 kV substation New Upland 500 kV substation

Permitting and Approval

The IVSG approached the 2,000+MW development as one large project, divided into phases extending across several years. This approach was intended to identify opportunities for consolidating all necessary approvals, in order to support development on a schedule responsive to California's Energy Action Plan goals for the addition of both renewable generation and new transmission capacity. The report presents several recommendations to this end.

The permitting plan is divided into sections addressing IID upgrades, SCE upgrades, SDG&E upgrades and LADWP upgrades, with strategies for expediting the required permitting. The report also proposes a comprehensive plan for consolidating the permitting of all components of the multi-phase project, and for streamlining the study and approval processes necessary.

The IVSG Permitting Work Group (PWG) has informed local, state and federal organizations and agencies that will be involved in any aspect of review and approval of the development, or could be affected by it, of the potential build-out. The agencies have requested that the environmental review and approval process be consolidated across the multi-phase project to avoid unnecessary re-study and to make the most efficient use of agency staff time dedicated to the overall project.

The IVSG recommends that permitting work for the overall development be organized as follows:

- Structure a broad, Programmatic EIR (P-EIR) to review the overall, multi-phase project under the California Environmental Quality Act (CEQA). A programmatic approach provides the best vehicle to address all of the environmental concerns from the different phases. The P-EIR would take its project description from the development plan drafted by the IVSG.

- Develop a Memorandum of Understanding among IID, SDG&E, LADWP and CalEnergy, to share the costs for the P-EIR and the work of writing the descriptions of each entity's development plans. IID would be the lead agency to prepare the P-EIR; the CPUC and CEC will be invited to participate from the beginning.

- IID, SDG&E, LADWP and SCE will work to identify the location of necessary transmission corridors being proposed for their individual phase components so that the Programmatic EIR can reflect all necessary plans. With respect to federal lands, the environmental documents under the National Environmental Policy Act (NEPA) to amend the California Desert Conservation Area Plan should be developed in conjunction with the EIRs or EAs for the second tier of Imperial Valley generation/transmission development. The Imperial County Geothermal and Transmission Element will be revised and adopted by the County Board of Supervisors in Phase 1.

The IVSG has developed this conceptual plan with the advice and cooperation of regulatory and agency staff.[4] The MOU parties will seek to continue this cooperation as they undertake the required environmental studies. The IVSG can attempt to bring the overall project to all state and federal regulators at the same time. State and federal agency staffs have heavy workloads. One method of assisting them in review of this project, which could also speed up the review process, would be to involve their environmental consultants earlier in the review process. Currently, the CPUC cannot retain consultants until a jurisdictional utility files a CPCN application. The subsequent retention of consultants adds considerable time to its review and approval process. Additional recommendations for streamlining and expediting the review and approval process are included in Chapter 4.

[4] The IVSG Permitting Work Group appreciates the cooperation and involvement of the BLM, CPUC, Imperial County Planning and Development Services Department, Imperial County Air Pollution Control District, and the California Department of Parks & Recreation.

1.0 Background and Purpose of the Imperial Valley Study Group

1.1 State Renewable Energy Goals and Imperial Valley Resources

California law requires investor-owned utilities, starting in 2003, to increase procurement of power from renewable resources by 1% per year until it comprises 20% of their supply mix, by no later than the end of 2017.[5] Most of California's publicly owned utilities, although not bound legally by this requirement, have adopted resolutions committing them to achieve this 20% target as well. The California Energy Commission estimates that meeting the SB 1078 20% goal will require 30,160 GWh/year of additional renewables generation in 2017.[6] Imperial Valley geothermal resources are estimated to be able to supply more than 50% of this amount. Imperial County is also estimated to have one-quarter of the state's entire solar generation potential, as well as small amounts of wind and biomass resources. Figure 1.1 below shows the location of Known Geothermal Resource Areas (KGRAs) in Imperial County.

In 2003, the Energy Commission, the CPUC and the Consumer Power and Conservation Financing Authority jointly adopted, and the Governor subsequently endorsed, a state Energy Action Plan. This plan accelerates achievement of the 20% procurement goal to 2010. To reach this goal, a total of about 6,600MW of renewables generation is needed. The CEC identified Imperial Valley geothermal power as a potential source of approximately one-third, 2,142 MW, of this requirement.[7]

Achieving these goals requires new and upgraded transmission infrastructure capable of delivering power from major renewable resource areas, including the Imperial Valley and the Tehachapi region, to the load centers. In June 2004, CPUC Decision 04-06-010, "Interim Opinion on the Transmission Needs in the Tehachapi Wind Resource Area,"[8] convened a collaborative study group to develop a comprehensive development plan for the phased expansion of transmission capabilities in the Tehachapi area. The study group was to be coordinated by the CPUC with assistance from the CAISO, and with the participation of the IOUs, wind power developers and other stakeholders. The Tehachapi Collaborative Study Group (TCSG) filed its initial report with the CPUC as required on March 16, 2005. This report presents a preliminary recommendation for the phased development of transmission facilities to access Tehachapi wind resources.

This CPUC decision also required the TCSG to consider whether to form additional planning collaboratives to develop transmission solutions for other renewable resource areas of the

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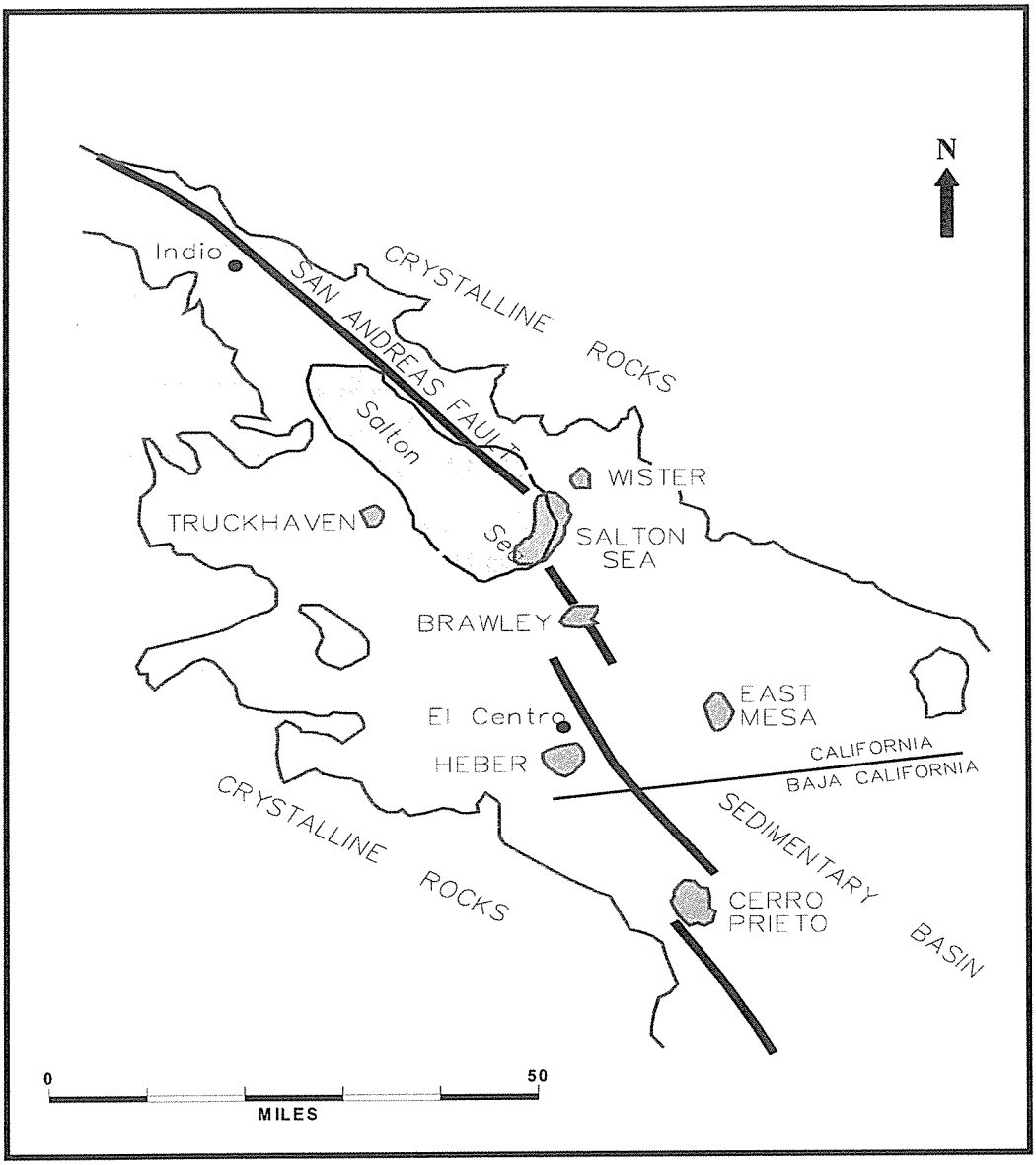
[5] Senate Bill 1078, Sher, Chapter 516, Statutes of 2002; and SB 1038, Sher, Chapter 515, Statutes of 2002.
[6] CEC, Renewable Resources Development Report, p. 139.
[7] Ibid., Appendix C-12. In 2005, a GeoThermex study for the CEC classified the "Most Likely" Imperial Valley geothermal development potential to be 1,950 MW. Roughly two-thirds of this is estimated to be currently available for development; access to the remainder may require the Salton Sea to recede, as is forecast, or advances in drilling technology.
[8] D.04-06-010 was issued in CPUC proceeding I.00-11-001. Phase 6 of this proceeding focuses on transmission constraints affecting development of renewable resources in the state.

Figure 1.1 Imperial Valley Geothermal Areas



state. In response, the TCSG established a committee and directed it to explore the formation of a study group to develop a phased development plan capable of accessing new Imperial Valley geothermal resources. At the same time, the CEC Integrated Energy Policy Report proceeding calls for the development of transmission solutions capable of accessing renewable resources, including Imperial Valley geothermal resources. The Imperial Valley Study Group (IVSG) was formed in response to these policy directives, with the goal of supporting achievement of the renewable energy goals of the Energy Action Plan and state law.

1.2 Mission of the Study Group

At its first meeting in November 2004, IVSG participants established a goal of specifying a phased development plan for the construction of transmission upgrades capable of exporting 2,200 MW of geothermal power from the Imperial Valley. In view of the very large solar generation potential in Imperial County, the IVSG subsequently decided to address the export of power generated by any renewable resource technology rather than focusing exclusively on geothermal power. In Phase 1 of the IVSG plan (the period to 2010), however, geothermal power is likely to be the predominant resource developed, and the transmission planning studies were completed using the electrical characteristics of geothermal generating units.

IVSG participants also set a goal of having its development plan represent the consensus recommendation of the stakeholder group to the extent possible. A joint planning process was intended to bring the knowledge and interests of key stakeholders together into an upgrade plan capable of providing the greatest statewide benefit at the least cost. The group recognized the support of key stakeholders for this plan to be essential if the recommended upgrades are to survive the challenges to final siting approval. Laying a foundation for approval and construction of physical transmission upgrades was seen as an essential part of the work of the study group.

1.3 Study Group Process and Participants

At its first meeting the Study Group adopted ground rules for cooperative group interaction. These were intended to make its work and decision-making as transparent as possible. Minutes of each meeting, reviewed and adopted by participants, have established a written record of the group's (and each committee's) progress. Meeting agendas, minutes and presentation materials are available on the IVSG website, www.energy.ca.gov/ivsg. Minutes of the IVSG Technical Work Group discuss study assumptions and the results of the technical transmission planning studies performed. This on-going study work has been reviewed at each meeting of the full Study Group. Overall, the study group has pursued its technical work in ways that help build stakeholder support for its recommended development plan. Participants recognize collaboration as essential to the development of this broad support.

The plenary Study Group established three committees to pursue its planning work:

- A Steering Committee, to direct the overall effort. The Steering Committee has lead responsibility for compiling the group's work into a recommended development plan. Members include IID, SDG&E, SCE, CPUC, CAISO, CalEnergy, and CEC/CEERT.

- A Technical Work Group (TWG) performs detailed transmission planning studies. TWG members include all the Transmission Owners in the region: IID, SDG&E, SCE, CFE, WAPA, Arizona Public Service (APS), Metropolitan Water District (MWD); and CalEnergy, CAISO, CPUC, and CEC/CEERT.

- The Permitting Work Group has the responsibility for identifying all required permits, and for designing a plan for consolidating and expediting the permitting of the entire 2,200 MW generation-transmission development. The PWG has worked to inform many local, state and federal agencies and organizations that may be involved in or affected by the development. PWG members include: Border Power Plant Working Group, CalEnergy, California Dept. of Parks and Recreation, Environmental Planning Group, IID, Imperial County Planning and Development Services Dept., Imperial County Air Pollution Control District, Los Angeles Dept. of Water and Power, SDG&E, Sempra, Sierra Club, SCE, and US Bureau of Land Management.

After discussion, the IVSG adopted an initial study plan proposed by IID, CalEnergy, CEERT and SDG&E at its first meeting. The IVSG subsequently approved amendments to this plan, as it evolved to incorporate the results of completed studies. IVSG transmission study assumptions, methodologies and results are outlined in Chapter 3. As discussed there, power flow and other transmission planning studies have been performed by the major transmission owners and the CAISO. As agreed, each participant has paid its own costs.

IVSG ground rules commit study group participants to work in good faith toward consensus support for a recommended development plan. The ground rules also specify that if it proves impossible to arrive at a consensus recommendation, participants disagreeing with the majority plan are encouraged to submit their written critique of that plan, and/or to submit an alternative development plan. The Border Power Plant Working Group and the Utility Consumers Action Network have indicated that they intend to prepare such an alternative plan.

A draft of this report was written by the Steering Committee and sent to the entire IVSG distribution list and the STEP (Southwest Transmission Expansion Plan) distribution list with a request for comment. The comments were then reviewed by the Steering Committee and incorporated into the report as deemed appropriate.

The plenary Study Group met five times between November 2004 and the submittal of this report on September 30, 2005. The Technical Work Group met bi-weekly during this period to accommodate the substantial workload of transmission planning studies required. The Permitting Work Group met six times, beginning in April 2005 to involve county, state and federal agencies in designing a plan for consolidating and expediting permitting and approvals. The following organizations have participated in study group meetings:

Arizona Public Service Company
Aspen Environmental Group
R.W. Beck
Border Power Plant Working Group
CalEnergy/MidAmerican Energy Company
California Department of Parks and Recreation
California Energy Resources Conservation and Development Commission
California Independent System Operator

California Public Utilities Commission
Center for Energy Efficiency and Renewable Technologies
City of San Diego
Colorado River Transmission Committee
Comisión Federal de Electricidad
Coral Power LLC/Shell Gas & Trading
Davis Power Consultants
Debenham Energy LLC
Desert Southwest Transmission
Environmental Planning Group
Imperial County Air Pollution Control District
Imperial County Planning and Development Services Department
Imperial Irrigation District
K.R. Saline & Associates
Kritikson & Associates
Lake Elsinore Advanced Pumped Storage
Lewis Brisbois Bisgaarad & Smith LLP
Los Angeles Department of Water & Power
Metropolitan Water District
Ormat Technologies, Inc.
PPM Energy
Salt River Project
San Diego Gas & Electric Company
San Diego Renewable Energy Office
Sandia National Laboratory
Sempra Energy
Sierra Club
Solargenix
Southern California Edison Company
Stirling Energy Systems, Inc.
Theroux Environmental
US Bureau of Land Management
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Western Area Power Administration

2.0 Recommended Development Plan

This chapter outlines the development plan recommended by the IVSG, its impact on regional flows and existing and planned facilities, and discusses the considerations that led to the compilation of the plan. This plan may be modified to accommodate future additions, such as the recently-proposed interconnection of the IID and LADWP systems. The IVSG, however, did not study the 500 kV line now proposed by LADWP, as it was announced after the IVSG had completed its technical work. That line is thus not included in the development phases recommended here.

The plan has two major elements: upgrades of the existing IID system; and construction of a new 500 kV line from the Imperial Valley (IV) substation to San Diego County, with 230kV connections to SDG&E's load center. SDG&E's project to accomplish this is called the Sunrise Powerlink. IVSG studies established that a line from the IV substation to San Diego County would make Imperial Valley generation deliverable to load centers in San Diego and to other load centers in Southern California and to the north.

The plan is divided into three phases, corresponding roughly to an anticipated schedule for selling the power from Imperial Valley renewable resources. The detailed studies performed to identify plan components and qualify the electrical performance of the plan are described in Chapter 3.

2.1 Development Phases

The IVSG recommends that the overall Imperial Valley generation-transmission development project be approached in these three phases:

	Year	New Generation	Cumulative	Power Flow
Phase 1	2010	645 MW	645 MW	IID to IV sub to new San Diego-Central, 500 kV
Phase 2	2016	645 MW	1,290 MW	IID to new San Felipe sub to San Diego-Central
Phase 3	2020	910 MW	2,200 MW	Increased flows on Phase 1-2 paths, plus upgrade Path 42

The detailed components of the upgrades required for each phase are described in section 2.2. Schematic depictions of these proposed upgrades are included below in Figures 2.1-2.3.

This recommended plan seeks both to maximize the use of the proposed IV-San Diego 500 kV line for renewables, and to avoid adding to the very large volume of power flows

forecasted for delivery to SCE's Devers substation. The Devers-Palo Verde #2 500 kV line (planned in-service 2009) is expected to bring large amounts of existing gas-fired generation from Arizona and new gas-fired generation from the Blythe area to an already-congested hub at Devers. A substantial amount of new thermal generation is also planned to be built adjacent to Devers. Plans to upgrade the SCE system west of Devers are costly and complex. In the timeframe of the IVSG development plan, it was not possible to adequately study the network upgrades necessary to make Imperial Valley generation deliverable west of Devers. The IVSG plan does, however, take account of the unintended flows likely across Path 42 from the Imperial Valley to Devers even when all Imperial Valley generation is scheduled to the CAISO across the proposed SDG&E 500 kV line into San Diego County.

In Phases 1 and 2, geothermal and solar power are the most likely renewable resources to be developed. The size and timing of these phases is based on the development and construction of three 215 MW geothermal power plants proposed to be built by CalEnergy at the Salton Sea KGRA. Plant construction requires 26 months. CalEnergy estimates that, subject to securing Power Purchase Agreements for each plant's output and financing, it can have three plants (645 MW) in service by the end of 2010; and that it could have an additional three plants of the same size in service every other year (2012, 2014, 2016). The phases can accommodate solar development and geothermal development by other companies in addition to, or instead of, geothermal development at the Salton Sea.

The total transfer capacity to be built in each phase is considerably greater than the amount indicated here, for several reasons. SDG&E studies show that it requires the new 500 kV line to maintain reliable operation of its system, as well as to access renewable resources and lower cost power. The 500 kV line required for Phase 1 provides enough capacity for all three phases of the IVSG development, even though Phases 2 and 3 are likely to be built several years after the 500 kV line goes into service. The upgrades of the IID system will add 1,000 MW of total transfer capacity to the present rating of those paths, more than is needed to export the 645 MW of renewable power in both Phases 1 and 2. It minimizes environmental impact and is more cost-effective to build facilities sufficient for several years' needs, rather than building in smaller increments. Transfer capacity not used by new geothermal projects in Phases 1 and 2 will be available to export solar and/or other power from the Imperial Valley.

In practice, the size and timing of the phases will be determined by where the renewable power is sold. Phases 1-3 support power sales to customers able to take delivery from the CAISO system, for example at the Imperial Valley substation. The proposed tie between the LADWP and IID systems at Indian Hills could require upgrade of IID's Coachella system sooner than anticipated in the IVSG plan. Power sales to purchasers in Arizona could also defer the need for the Phase 1 or Phase 2 upgrades of the IID system, and instead might require upgrades of IID's connections to the WAPA and/or APS systems (at the Buck/Blvd. Substation in Riverside County), and/or to APS, at the Pilot Knob substation. Flows across these upgrades to purchasers to the east of IID would offset flows from Arizona into California, potentially reducing congestion on key east-west paths. It is also possible that power sales could require the identified Phase 1-2 upgrades (for deliveries to the CAISO grid) and upgrades of other IID interconnections.

Figure 2.1 Diagram of Phase 1 Upgrades

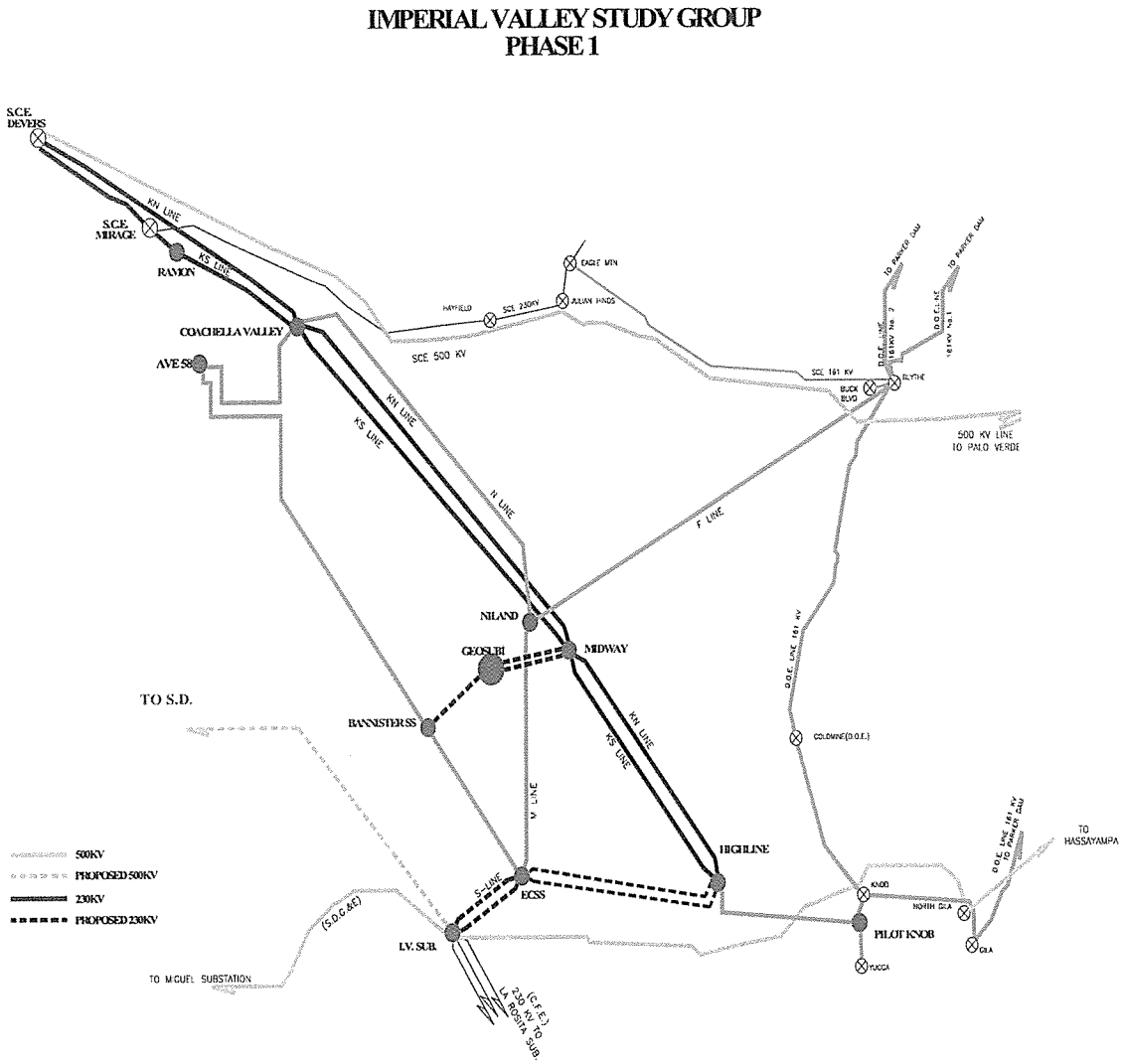


Figure 2.2 Diagram of Phase 2 Upgrades

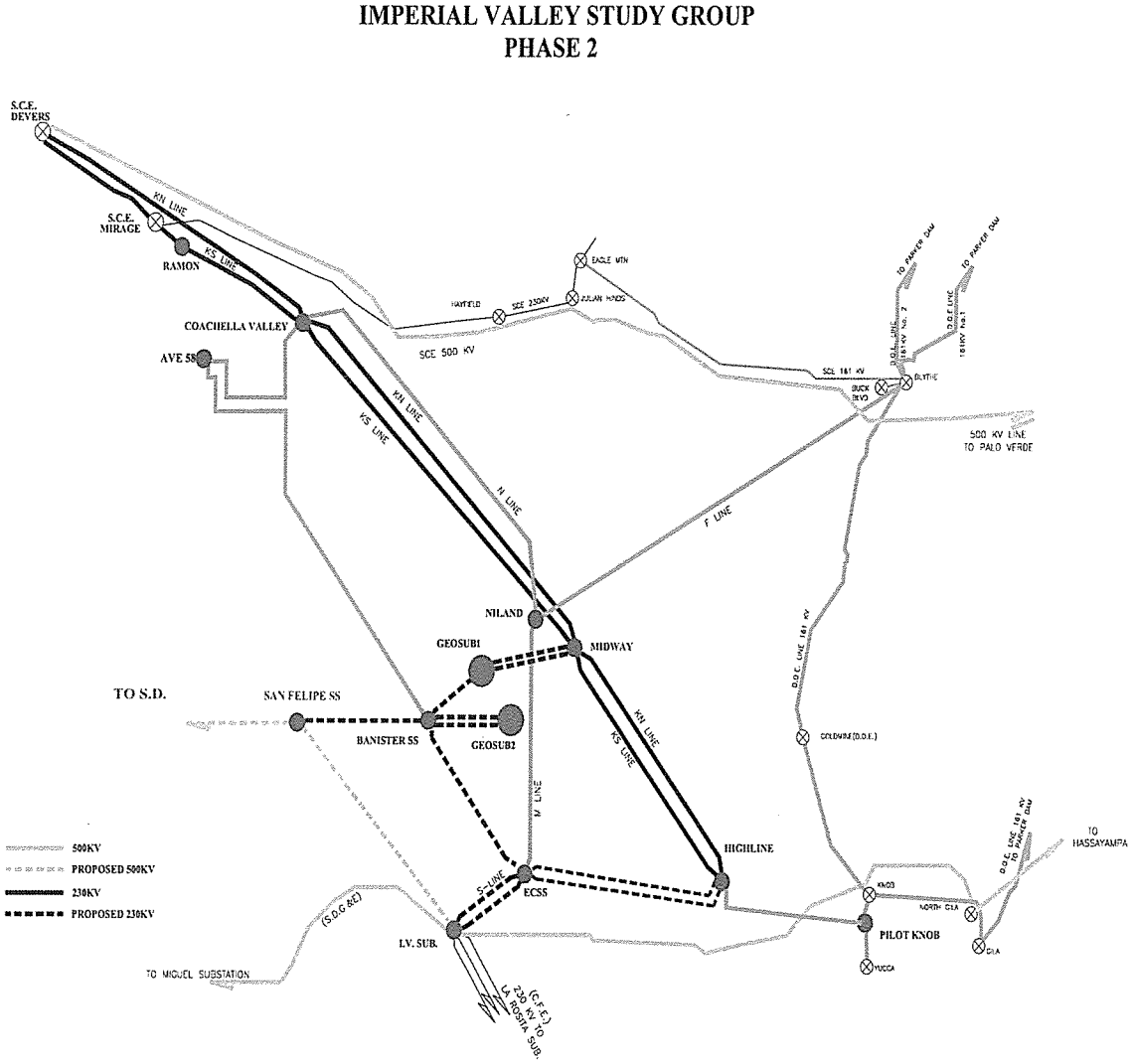
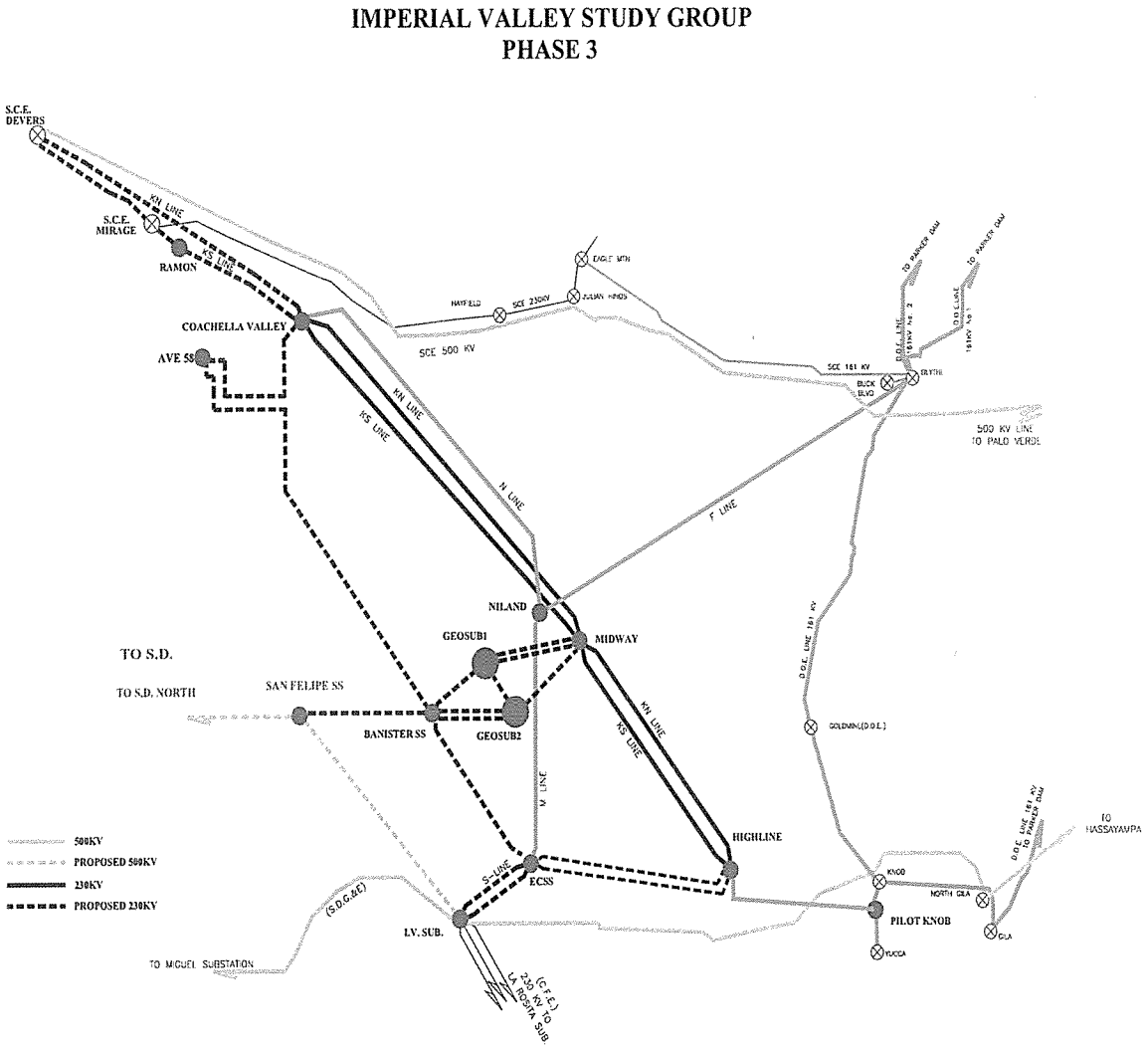


Figure 2.3 Diagram of Phase 3 Upgrades



2.2 Major Components of Each Phase and Conceptual Cost Estimates

Phase 1 Components

Upgrades of the IID system and a 500 kV line to export power from the Imperial Valley to San Diego are the two major components of Phase 1. IID upgrades include the facilities anticipated to deliver from the existing Midway 230 kV substation to the existing Imperial Valley 230 kV substation. To initially establish this delivery path, an existing double circuit (161 kV and 92 kV) transmission line between IID's Highline and El Centro substations is proposed to be upgraded to double circuit 230 kV by utilizing existing towers insulated to 230 kV and higher strength (ACSS, ACCC or equivalent) conductor to minimize the clearance issues under emergency conditions. To further deliver the anticipated path requirements for Phase 1, IID proposes to upgrade the existing El Centro to Imperial Valley 230 kV line to double circuit 230 kV, with each circuit capable of a maximum of 800 MW capacity. The upgrade to this transmission line will require that IID first construct the proposed Imperial Valley to Dixieland 230 kV line to provide a path for Palo Verde area schedules (i.e., SWPL rights) to be delivered to IID loads.

The 500 kV line from Imperial Valley to San Diego will also be constructed in this phase.

IID estimates the total cost to provide the facilities proposed for its system in Phase 1 to be $72,000,000. No costs for the 500 kV line are included. SDG&E, for its part, will release cost estimates for the Sunrise Powerlink when it files the CPCN application for this line in the fourth quarter of 2005.

Phase 2 Components

Phase 2 includes the facilities anticipated to deliver from the existing Bannister 230 kV substation to both the Imperial Valley substation and IID's proposed San Felipe 500 kV substation. To provide for these contract paths, the existing Bannister to El Centro 161 kV line will be upgraded to 230 kV, providing a maximum capacity of 800 MW. In addition, IID will construct a new 20-mile, 230 kV line from Bannister to the proposed San Felipe substation, also capable of a maximum capacity of 800 MW.

IID estimates the total costs to provide the facilities proposed for Phase 2 to be $60,000,000.

Phase 3 Components

Phase 3 includes the facilities needed to deliver additional resources beyond 2016 to the regional transmission system. These are upgrades of existing IID facilities. They include the Bannister to Coachella Valley 161 kV line; the Highline to Midway 230 kV lines; and the Coachella Valley to Mirage and Devers 230 kV lines. The Bannister to Coachella Valley 161 kV line will be upgraded to 230 kV and capable of a maximum capacity of 800 MW. The existing Highline to Midway 230 kV line will add an additional conductor "per phase" to

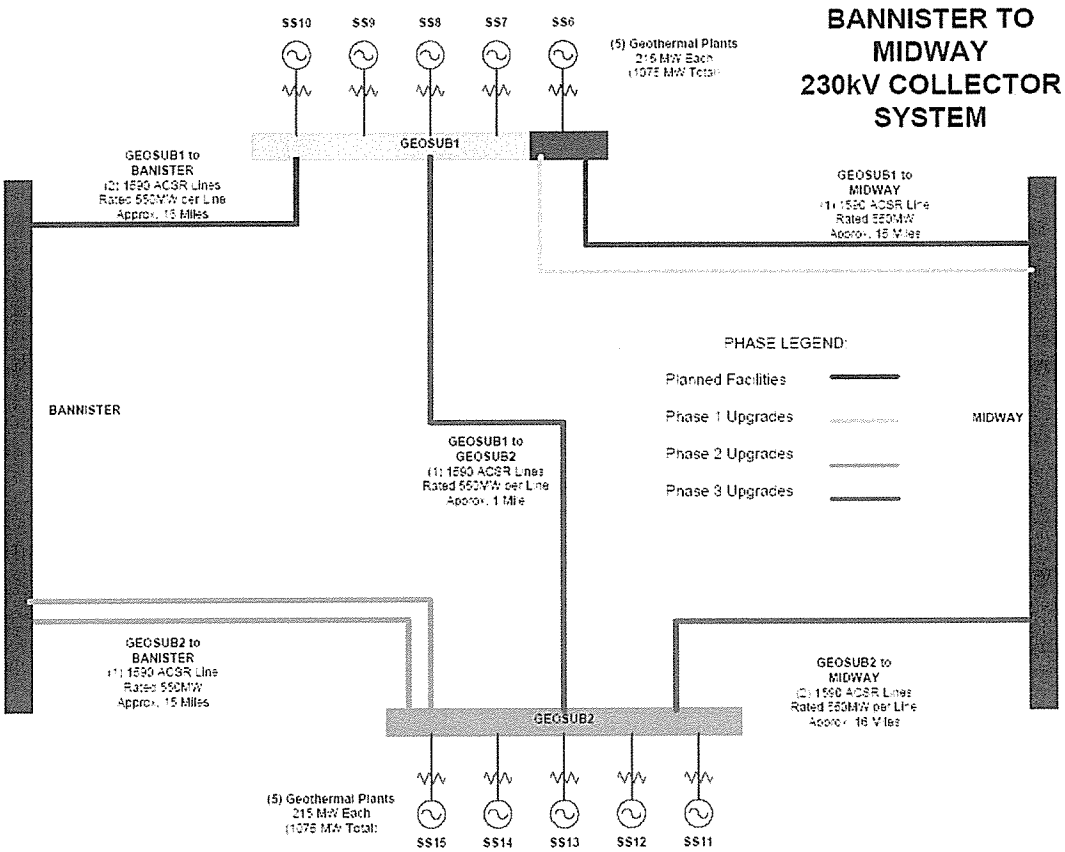
bundle this segment, providing a maximum capacity of 1,600 MW. The Coachella Valley to Mirage and Devers 230 kV lines are also facilities that will utilize existing towers with new high strength conductor to minimize clearance issues, in order to obtain a maximum capacity for this segment of 1,600 MW. With Phase 3, IID will also determine the need for rebuilding the Highline to El Centro 230 kV double circuit line with newer structures and conductor, in order to provide a maximum capacity of 1,600 MW in that path.

IID estimates the total costs to provide the facilities proposed for Phase 3 to be $105,000,000.

Salton Sea area Collector System

To interconnect individual generation facilities, IID proposes to construct a 230 kV transmission system consisting of two primary collector substations, and three transmission lines connected to both the Midway and Bannister substations. This collector system also will be constructed in phases as described for the other IID upgrades and required delivery points. Figure 2.4 depicts the proposed IID Salton Sea area collector system.

Figure 2.4 Proposed IID Collector System



Path 42 Upgrades

Path 42 is a 230 kV transmission path between Southern California Edison (SCE) and the Imperial Irrigation District (IID). The path has a WECC rating of 600 MW and includes the Coachella-Ramon-Mirage 230 kV and Coachella-Devers 230 kV lines. A developer's request to secure a Power Purchase Agreement with SCE for the amount of power greater than the 600 MW rating would trigger upgrades of this path. Such an upgrade would be based on the best technical and economic solution and would depend on the amount of resource delivery to the CAISO grid. IID may also choose to upgrade its portion of this path to serve its local load, and/or to connect to the proposed LADWP 500 kV line.

If the generation-transmission development follows the three phases outlined in this Report, Path 42 upgrade would not be required until 2020. IID upgrades of this path, however, could be required sooner. If congestion occurs on Path 42 due to inadvertent flow resulting from delivery schedules to SDG&E's system, than the upgrade of Path 42 would become an economically driven project to reduce congestion costs.

WECC Rating Studies would be needed to determine the achievable higher rating after the upgrade of Path 42. The Path 42 rating would be dependent on downstream impacts on the SCE west of Devers system, in addition to the technical performance of the re-conductor lines within Path 42. The impacts on the SCE's west of Devers Substation system could be significant when considering the large amount of existing generation and transmission interconnection requests in the queue for the Devers Substation area.

Pilot Knob 161 kV and Yucca 69 kV Stations

APS has expressed concerned that generation additions in the IID service territory could cause congestion on the system between IID's Pilot Knob 161 kV and APS's Yucca 69 kV switching stations. Excessive southbound flows on this system can reduce the load serving capability of APS's Yuma load pocket. Historically, schedules on this line have been northbound into IID's service area from its Yucca steam unit. However, recent generation additions have produced loop flow into the Yuma area and have restricted import capability into the area. APS proposes to have this system upgraded or have the loop flow mitigated if any of the phases of the geothermal development proposed in IID's service area proceed in the future.

2.3 Feasibility and Synergies with Regional Projects

Power flow, stability and post-transient analysis studies performed by the IVSG show the proposed plan to be capable of delivering 2,200 MW of new Imperial Valley generation to major regional buses without negative effect on reliability or grid operation across the region. All regional transmission owners having facilities that could be affected by the proposed plan participated in these studies; the studies themselves are described in Chapter 3. Production simulations performed by the CAISO indicate that implementation of the plan could potentially reduce wholesale power costs by several hundred million dollars/year.

The recommended plan takes advantage of two major projects proposed for the region: IID system upgrades; and a new 500 kV line from the Imperial Valley (IV) substation to San Diego County, with 230kV connections to SDG&E's load center. SDG&E's project to accomplish this is called the Sunrise Powerlink. SDG&E has proposed building and owning this line and is in the process of planning this project, which was studied as part of the IVSG effort. Alternatively, portions of that line or another 500 kV line in Imperial County could be built and owned by IID.

Prior to the formation of the IVSG, the Imperial Irrigation District identified a comprehensive set of upgrades of its existing system that would enable it to export significant amounts of new generation from renewable resources in the Imperial Valley. It has presented this upgrade plan in CEC workshops and other fora as its Green Path initiative. It has completed many of the electrical studies, and has identified the environmental and permitting work necessary for these upgrades. The IVSG plan utilizes several (but not all) of these upgrades of the IID system.

The IID upgrades minimize environmental impact and appear cost effective because they upgrade existing facilities and require little new Right of Way (ROW). In many cases, higher capacity conductors can be mounted on existing towers, with little or no widening of ROW required. For purposes of the IVSG development plan, IID's planned Bannister substation is treated as an existing facility, because IID has committed contractually to build it under the terms of its agreement to purchase the output of CalEnergy's 215 MW Salton Sea Unit 6 geothermal plant, which is expected on-line in 2008. The IVSG plan does require IID to add new facilities as well as upgrades, including a collector substation at the Salton Sea geothermal field, to which most of the projected new geothermal power capacity would connect; and a new 230 kV line from the Bannister substation to a new 500/230 kV San Felipe substation, to allow connection to the proposed 500 kV line into central San Diego.

The IVSG plan also takes advantage of a new 500 kV line from the Imperial Valley substation to San Diego County, which has been independently studied by SDG&E and STEP, a stakeholder review group made up of transmission planners from the larger southwest region. STEP reviewed studies of 18 alternative routings/connections SDG&E considered for this 500 kV line, and assisted in narrowing these to two final alternatives. SDG&E studies show this connection is required to ensure the reliable operation of its system after 2010. This line will also help the company meet its RPS requirements for the purchase of renewable energy, and will provide access to lower cost power sources. Ownership and operation of the portion of this line in Imperial County has not yet been determined.

The IVSG did not assume that the 500 kV line would be a component of its recommended plan. Instead, that line was one of a number of alternatives evaluated. The IVSG concluded after study that a 500 kV connection to the CAISO would be most effective. Connections at 230 kV were shown not to be as effective electrically, given the goal of exporting 2,200 MW of power, and alternative paths for multiple 230 kV connections are limited in the region. However, depending on the renewable delivery requirements, some components may be

constructed at 500 kV standards and operated initially at 230 kV. The extensive studies of the Southern California region performed by SDG&E for its 500 kV Comparison Study provided both data and insight into regional needs and constraints. The IVSG was able to leverage this work in its own transmission planning studies.

The IVSG development plan anticipates scheduling most new Imperial Valley generation (except purchases by LADWP or Arizona LSEs) to SDG&E, to the extent possible. This avoids adding flows across Path 42 to the Devers substation. The very large volume of new flows expected at Devers are likely to require expensive network upgrades which, given the complexity of problem, may take several years to resolve. An export plan that relied on making Imperial Valley generation deliverable through Devers accordingly would risk delaying Imperial Valley development until a regional plan for resolving west of Devers issues, including additional 500 kV facilities, is identified and approved.

When the amount of new generation connected in the Imperial Valley becomes substantial, this will likely create some unintended flow across Path 42, even with all the generation scheduled to SDG&E. IVSG studies found that in Phase 2, with 1,290 MW of renewable output scheduled to San Diego, inadvertent flow across Path 42 was 60 MW. In Phase 3, with 2,200 MW of new generation added, unscheduled flow across Path 42 was 210 MW. This flow may require the upgrades of Path 42 described above, depending on the congestion cost the CAISO observes on this path.

2.4 Production Cost, Congestion and Losses

The CAISO performed production cost simulations to estimate the economic and physical performance of the final three configurations of the IVSG generation/transmission development plan. These studies are described in detail in section 3.5 of this report. They indicate that adding 2,200 MW of new geothermal generation and the associated transmission in each of the various alternatives reduces WECC annual production cost, and congestion, by significant amounts. Each of the project alternatives reduced the hours of transmission congestion across the WECC by, on average, 4,400 hours/year (3%), as the new transmission capacity supported greater power flows. Losses increased, because generation in the Imperial Valley displaced more expensive generation closer to load. Adding the renewable generation reduced the total variable cost of generation WECC-wide by more than $500 million/year.

These simulations, however, were designed to compare transmission alternatives, not to justify investment decisions. Renewable generators have low marginal costs. Adding them to the generation mix will displace higher cost resources, thus reducing system-wide production cost. The simulations performed to date, however, were not designed to produce a reliable forecast of the potential savings. A full economic evaluation would have to model, among other things, a current forecast of gas prices, regional differences in gas prices, a range of hydro conditions, and the capital cost of the new generation and new transmission. The IVSG did not have the time to complete this work.

The IVSG determined that this report did not need to include a full economic evaluation of its recommended development plan, for several reasons: 1) full economic evaluation, which would entail significant additional work, is not expected of a conceptual plan. 2) with a connection to LADWP now being considered, the structure and timing of the phasing could change, making economic analysis premature. 3) SDG&E is working on an economic analysis of the 500 kV project, a major component of the IVSG plan, using the TEAM methodology; this includes the addition of 2,200 MW of geothermal generation in 2015. The results of that analysis, expected to be competed in October 2005, may help indicate the costs and benefits of the IVSG development plan.

2.5 Anticipated Development Schedule

Today, 523 MW of geothermal generating capacity is in operation in the Imperial Valley. Additional generation will be added before Phase 1 of this plan. In 2005, SCPPA contracted to buy 20 MW of new geothermal generation from Ormat's Heber facilities. As described above, IID and CalEnergy have signed a Power Purchase Agreement under which IID will buy the output of Salton Sea Unit 6, a 215 MW generator expected to be on-line in 2008. As part of the Power Purchase Agreement, IID will build a new Bannister substation to accommodate the new plant. IID plans to use the plant output to serve its own load, and transmission to export Salton Sea Unit 6 power out of the Imperial Valley is not required.

CalEnergy is in active discussions with potential power purchasers for sale of the output of three additional plants, Salton Sea Units 7-9. Like Salton Sea Unit 6, each will be 215 MW. The IVSG Phase 1development schedule depends in part on CalEnergy signing Power Purchase Agreements for these three plants, 645 MW total output. There is no guarantee that CalEnergy will be able to complete the development of these plants on the Phase 1schedule developed by the IVSG.

The permitting of each 215 MW plant requires 18 months. Construction requires an additional 26 months. Meeting the Phase 1 development target of 2010 would require permitting work to begin in the next two years. CalEnergy has stated that, given executed PPAs, it has the ability to construct these plants at the same time, or on overlapping schedules.

Concentrating Solar Power (CSP) could make up some portion of Phase 1 power exports, replacing part of the anticipated geothermal development, or adding to it, thus increasing Phase 1 development beyond 645 MW in the 2010 timeframe.

To support this generation development, Phase 1 upgrades of IID's system include a new Geothermal Collector Substation, expansions to the El Centro and Midway Substations and upgrades to the Highline – El Centro – Imperial Valley lines. IID has already begun design and preliminary work for these upgrades, which are needed by 2010 both to export new renewable resources and to serve anticipated growth within the Imperial Valley.

The other major component of Phase 1 development is a new 500 kV line from the Imperial Valley substation to San Diego County, with 230 kV connections to SDG&E's load center. SDG&E's project to accomplish this is called the Sunrise Power Link. As shown by this IVSG study effort, a new 500 kV line into SDG&E's system is needed for the ultimate development of renewable resources in the Imperial Valley. However, because it needs this new line by 2010 for reliability reasons, as well as to access renewables and lower cost power, SDG&E is pursuing this new line independent of renewable resource development in the Imperial Valley. SDG&E anticipates filing the purpose and need portion of its CPCN application for this line by the end of 2005. SDG&E will also pursue CAISO and WECC approval. The company anticipates an environmental filing with the CPUC by mid-2006. The current anticipated in-service date for the Sunrise Power Link is mid-year 2010.

In Phase 2 (to 2016), CalEnergy expects to develop at least one additional 215 MW geothermal plant. The development of Concentrating Solar Power projects is expected to accelerate in this period, and to make up a significant portion of Imperial Valley renewable resource exports.

To support the export of an additional 645 MW of renewables in Phase 2, IID plans further upgrades to its system, including a new San Felipe 500/230 kV substation, interconnecting to the proposed Imperial Valley to San Diego 500 kV line; a new 230 kV line from Bannister to San Felipe; and upgrades to the existing El Centro – Bannister 230 kV line.

Phase 3 anticipates the build-out of any Imperial Valley geothermal potential not already developed. Depending on the amount of geothermal development in Phases 1-2, this could represent an incremental 660 MW to 910 MW (of the 1,950 MW total geothermal resource). CSP development is also expected to contribute substantially to renewable power exports in this phase.

Transmission development associated with Phase 3 includes upgrades of the IID and SCE systems in Path 42, from Coachella Valley to Mirage/Devers; and upgrades to existing lines from Bannister to Coachella Valley. Phase 3 transmission upgrades can be moved earlier if renewable resource development warrants doing so.

2.6 Relation of the IID Green Path to IVSG Development Phases

IID intends to develop its Green Path Project as a mechanism for staging long-term upgrades of the IID transmission system in a much shorter term (five years or less) than contemplated in Phases 1-3 of the IVSG development plan. This Project will pursue first the development and pre-design of all the upgrades in the long-term plan, and the proposed San Felipe and Indian Hills facilities. IID has also taken steps to ensure that the Salton Sea area collector system can be staged to accommodate additional generation as ultimately discussed in this report. While the staging of the Green Path is still in draft form, the following describes the potential construction sequence and triggers that will support IVSG development phases:

Stage 1 will consist of constructing the Highline to El Centro 230 kV double circuit line and associated substation facilities. This stage will accommodate additional power schedules towards the Imperial Valley substation.

Stage 2 will consist of constructing the upgrades of the El Centro to Imperial Valley 230kV line to a new double circuit 230 kV line. The associated substation facilities will also be constructed to terminate the lines. Green Path Stages 1 and 2 correspond to IVSG Phase 1 development.

Stage 3 will consist of constructing the upgrade of the existing El Centro to Bannister 161 kV line to new 230 kV standards, and will also include the necessary substation facilities to terminate the upgraded line.

Stage 4 will consist of constructing the new Bannister to San Felipe 230 kV line and associated substation facilities. Depending on the level of the build out of the renewable resources, this segment could deliver the resources towards the San Diego area prior to the construction of the 500 kV line from Imperial Valley. However, as the additional renewable resources are constructed (as described in Phase 1 of the geothermal development), the 500 kV line also provides additional delivery capability into SP15, primarily to SDG&E. Green Path Stages 3 and 4 correspond approximately to IVSG Phase 2 development.

Stage 5 will consist of upgrading the Bannister to Avenue 58 and to Coachella Valley 161 kV line to 230 kV, including the necessary substation upgrades to accommodate the 230 kV terminations.

Stage 6 will consist of completing the additional upgrades as required to the Coachella Valley to Mirage and Devers 230 kV system. Green Path stages 5 and 6 correspond to IVSG Phase 3 development.

The Indian Hills connection to both LADWP and DPV2 may also occur simultaneously with the development of this Green Path project, in Phase 1 or Phase 2 of the IVSG development plan.